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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/823,773

04/14/2004

Takahiro Hamada

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08/16/2006

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EXAMINER

GIMIE, MAHMOUD

ART UNIT

PAPER NUMBER

3747

DATE MAILED: 08/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/823,773

Applicant(s)

HAMADA ET AL.

Examiner

Mahmoud Gimie

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02 August 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-7 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-7 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 August 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>7/25/06</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dam et al (6,715,693).

Dam et al (Dam '693) discloses a fuel injection valve (14) comprising: a needle valve (86) including a base material (95); an opposite member (nozzle, see figure 1) including a base material whose sliding section is in slidable contact with a sliding section of the base material of the needle valve (86) in presence of fuel for an automotive vehicle; and a hard carbon (metal carbon) thin film (96) coated on at least one of the sliding sections of the base materials of the needle valve and the opposite member, the hard carbon thin film having a surface hardness ranging from 1500 to 4500 kg/mm² in Knoop hardness (hardness of greater than 1000 kg/mm², see col. 6 and ll. 9), a film thickness ranging from 0.3 to 2.0 μm (thickness desirably no greater than about 2.0 microns, and preferably between 0.5 and 1.7 microns, see col. 5 and ll. 11-16).

Dam '693 does not disclose a formula for roughness, but since the range of values for each variable in the formula provided by the current invention are disclosed, it would have been obvious to one of ordinary skill in the art at the time the invention was made

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to apply the known values of the independent variables in the formula to obtain further measures such as roughness. The motivation to do so would have been to calculate surface roughness based on various hardness and thickness values.

3. Claims 2-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dam et al (6,715,693) in view of Haji et al (6,514,298).

Dam '693 discloses all the limitations as applied to claim 1 above except for ester- or amine-based additives.

Haji '298 discloses ester-, or amine-based additives (col. 21 and ll. 66-67; col. 22 and ll. 6; col. 1 and l. 33) selected at least from one of the groups.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to add additives to the fuel. The motivation to do so would have been to provide detergent effect to conventional gasoline and detergency of fuel injection nozzles of a diesel engine, see abstract of Haji et al.

With regard to claims 3-7, see above rejected claims and Haji et al.

Claim Rejections - 35 USC § 103

4. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Coffinberry (6,156,439).

Coffinberry discloses a fuel injection valve comprising: a needle valve including a base material; an opposite member including a base material whose sliding section is in slidable contact with a sliding section of the base material of the needle valve in presence of fuel for an automotive vehicle; and a hard carbon thin film coated on at least one of the sliding sections of the base materials of the needle valve and the

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opposite member, the hard carbon thin film having a surface hardness ranging from 1500 to 4500 kg/mm² in Knoop hardness, a film thickness ranging from 0.3 to 2.0 μm (thickness of at least 0.5 micrometers, col. 6 and 51).

Coffinberry does not specify a formula for roughness, however teaches that the surface roughness to be no more than 4 micrometers, col. 3 and ll. 31-33, which reads on the claimed subject matter of roughness ranging from 0.144 (h=0.3, HK=4500 to 1.213 (h=2, HK=1500).

It would have been obvious to one of ordinary skill in the art at the time of the invention to recognize an optimum range, since it has been held that discovering the optimum range involves only routine skill in the art, in re Aller, 105 USPQ 233. The motivation to do so would have been to optimize surface roughness.

5. Claims 2-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Coffinberry (6,156,439) in view of Haji et al (6,514,298).

Coffinberry discloses all the limitations as applied to claim 1 above except for ester- or amine-based additives.

Haji '298 discloses ester-, or amine-based additives (col. 21 and ll. 66-67; col. 22 and ll. 6; col. 1 and l. 33) selected at least from one of the groups.

It would have been obvious to a person having ordinary skill in the art at the time the invention was made to add additives to the fuel. The motivation to do so would have been to provide detergent effect to conventional gasoline and detergency of fuel injection nozzles of a diesel engine, see abstract of Haji et al.

With regard to claims 3-7, see above rejected claims and Haji et al.

Response to Arguments

6. Applicants' arguments filed 8/2/06 have been fully considered but they are not persuasive.

Applicants argued that the cited references do not teach the relationship set forth in the formula (A).

This is not persuasive because the range of permitted values for the independent variables of the surface hardness (Hk) and the film thickness (h) as claimed are disclosed in the prior art, in one instance (Dam '693), that can generate the dependent variable of roughness (Ry) in consistency with the formula, or thickness and roughness are disclosed in another instance (Coffinberry '439) that generates hardness in consistency with the formula.

In all cases, no mathematical formula can be used as a practical matter without establishing and substituting values for the variables expressed therein; Sarkar, 588 F.2d at 1335, 200 USPQ at 139, MPEP 2106. Consequently, when the prior art discloses the allowed values for the variables in an equation, the mathematical symbols by themselves per se cannot simply overcome the prior art.

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The cited references show coated fuel injector needles.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mahmoud Gimie whose telephone number is 571-272-4841. The examiner can normally be reached on Monday-Friday between 7 a.m. -3:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Henry Yuen can be reached on 571-272-4856. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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**MAHMOUD GIMIE
PRIMARY EXAMINER**